FOREST PEST CONDITIONS IN CALIFORNIA-1971

A PUBLICATION OF
THE CALIFORNIA FOREST PEST CONTROL ACTION COUNCIL

THE CALIFORNIA FOREST PEST CONTROL ACTION COUNCIL is an organization, founded in 1951, of private and public forest managers, foresters, entomologists, pathologists, zoologists, and others interested in the protection of forests from damage caused by animals, insects, and diseases. The State Board of Forestry recognizes the Council as an advisory body with respect to pest protection matters. The Council is also a participating member of the Western Forest Pest Committee of the Western Forestry and Conservation Association.

THIS REPORT, FOREST PEST CONDITIONS IN CALIFORNIA - 1971 is compiled for public and private forest land managers to keep them informed of pest conditions on forested lands in California, and as a historical record of pest trends and occurrences. The report is based largely on information provided by the California Cooperative Forest Pest Detection Survey. In 1971, 477 reports were received: 240 for insects, 205 for diseases, and 27 for animal damage.

The report was prepared by the Forest Service and the Bureau of Sport Fisheries and Wildlife in cooperation with the Council members. It was duplicated and distributed by the California Division of Forestry.

THE COVER PHOTO: The pocket gopher (Thomomys spp.) inflicts considerable damage on reforestation projects throughout the State. The type of damage is often mistaken for porcupine damage. (See pages 16 and 17.)

Sacramento January 1972

HIGHLIGHTS OF PEST CONDITIONS - 1971

STATUS OF INSECT PESTS. The Douglas-fir tussock moth, the subject of a special report last year, has again demonstrated a nearly explosive ability to build up epidemic populations in California forests During a brief period in August and September 1971, sizable areas of green fir forests faded into scorched appearing groups of trees nearly denuded of foliage by the voracious feeding of maturing larvae. The trend of this epidemic is confusing: in some severely defoliated areas the populations have nearly collapsed without the usual high incidence of virus disease, whereas in low population areas the trend appears to be in the opposite, or increasing direction.

The increasing trend of lodgepole pine needle miner populations in Yosemite National Park is expected to continue.

Bark beetle activity, in most areas, remained at a low level during the year. Continuing studies of bark beetle attractants, for the survey and control of the western pine beetle, produced promising results during 1971.

The potentially damaging western pine tip moth was detected for the first time in California in 1971.

STATUS OF DISEASE PESTS. Several minor leaf, needle and canker diseases were prevalent this year, presumably because of the wet, cool, spring conditions. These diseases are not expected to persist.

A fungus on Douglas-fir, Dermea pseudotsugae, first discovered in California in 1970, was found in many areas throughout Humboldt, Trinity, Siskiyou, and northwestern Mendocino Counties. Little is known about its threat to plantations.

For the first time in more than 40 years, no ribes were eradicated in an effort to control white pine blister rust. Instead, the search for rust-resistant sugar pine was intensified and extended to new areas.

STATUS OF ANIMAL PESTS. Porcupines, deer and pocket gophers are the three major pests in the forest animal damage picture. Porcupine damage was widespread and this year exceeded that normally recorded for deer. Plantations and natural stands in Siskiyou and Modoc Counties were the areas most seriously damaged. Deer depredation continues to be a major problem. Pocket gopher damage was reported as static to increasing. Damage seems to be increasing in those areas that are not treatable by machine.

STATUS AND CONTROL OF INSECT PESTS

WESTERN PINE BEETLE, Dendroctonus brevicomis. Although infestations of the western pine beetle were reported from some 25 locations in northern California, the continuing epidemic in the young pine stands at McCloud Flats, Siskiyou County, remains the only large and serious infestation.

In southern California, however, this beetle continues to cause high tree mortality at Lake Arrowhead and Barton Flats, San Bernardino County, where it is associated with serious air pollution damage on ponderosa pine. In addition, an upward trend is occurring where fires burned thousands of acres of timber in San Bernardino and San Diego Counties in the fall of 1970.

The Forest Service is salvaging the fire-damaged timber in southern California on National Forest land where terrain is not too steep. The Corps of Engineers, through the Office of Emergency Preparedness, has contracted with private firms to clear the fire-damaged timber from private lands.

A large-scale field test was conducted in the McCloud Flats area to determine the effectiveness of synthetic attractants for the suppression of the western pine beetle as well as for the survey of in-flight beetle populations. As with the first large-scale test in 1970 at Bass Lake, Madera County, large numbers of beetles were trapped. Further evaluation of in-tree populations and overall tree mortality on the Bass Lake study area was conducted in 1971. Similar evaluations on the McCloud Flats study area will be continued over the next two years. Data analysis and evaluation is so complex in these tests that the intrinsic effects of this trapping on the two infestations may not be known for some time. The many man-months of work required by these cooperative tests are provided by Forest Service, California Division of Forestry, and University of California entomologists, foresters, and technicians.

FIR ENGRAVER BEETLE, Scolytus ventralis. Tree-killing by fir engraver beetles accelerated in 1971. Tree losses seemed most severe and widespread on the Klamath National Forest, Siskiyou County, but were reported from most forested areas from El Dorado County, north to the Oregon border. When possible, infested trees were removed by logging to suppress local buildups. Additional surveys are needed to investigate the trend of these infestations in 1972.

MOUNTAIN PINE BEETLE, Dendroctonus ponderosae. This beetle continues to be closely associated with air pollution damage to ponderosa pine around Lake Arrowhead and with fire-damaged timber at Smiley Park in San Bernardino County. Limited chemical control was needed to destroy mountain pine beetle broods in the bark of infested lodgepole pine trees in the Wrights Lake recreation area, El Dorado County, and also in the Silver Creek summer home track, Placer County. The killing of scattered, large, individual sugar pine trees by this beetle is again becoming noticeable in the Sierra Nevada Range around Yosemite and in Sequoia and Kings Canyon National Parks.

PINE ENGRAVER BEETLES. The California five-spined ips, Ips paraconfusus, by breeding up large populations in storm-damaged trees, threatened valuable silvicultural research studies in the Elliot Ranch Plantation, Placer County. This threat was alleviated by treating about 200 small infested trees with lindane sprays. Fifty knobcone pine trees also were attacked and had to be sprayed with lindane to protect a special tree breeding grove at the Institute of Forest Genetics near Placerville, El Dorado County. This beetle has also been identified as the cause of widespread Monterey pine tree mortality of ornamental plantings in suburban cities east of San Francisco in Contra Costa County. In late summer and fall, infestations of this ips were reported developing on most of the timbered lands damaged by fire in southern California during 1970.

Another ips beetle, Ips pini, caused minor but threatening damage in the initial phases of a dwarf mistletoe control project on the Kern Plateau. A modified cutting schedule was recommended to better manage the ips population in this area.

OTHER BARK BEETLES. The Jeffrey pine beetle, Dendroctonus jeffreyi, and California flatheaded borer, Melanophila californica, displayed increased activity in parts of southern California. The red turpentine beetle, Dendroctonus valens, was abundant in association with the western pine beetle epidemic at McCloud Flats. The Douglas-fir engraver, Scolytus unispinosus, was found frequently associated with a recently discovered canker disease, Dermea pseudotsugae of Douglas-fir.

DOUGLAS-FIR TUSSOCK MOTH, Hemerocampa pseudotsugata. Infestations of the Douglas-fir tussock moth underwent a variety of conditions and trends during 1971.

Overwintering eggs hatched in late June. Extensive surveys of early larval stages, conducted during the first half of July, indicated continuing and increasing infestations at Raymond Mountain-Mariposa Grove, Mariposa County; and Iron Mountain, Baltic and Plummer Ridges, El Dorado County; whereas, insignificant or absent populations were indicated in all the other areas of known or suspected infestation. However, despite the considerable effort expended on surveys, two previously undetected infestations caused severe defoliation on approximately 1,300 acres (Nevada Point Ridge, Placer County), and 2,500 acres (Mattley Ridge, Calaveras County) during August and September.

In September, a severe dieoff of mature larvae occurred in Nevada Point Ridge, Iron Mountain, Baltic Ridge, Plummer Ridge and Mattley Ridge infestations. Mumified larvae littered the ground, but laboratory examinations failed to indicate the cause of this widespread insect mortality. At the same time, the Raymond Mountain-Mariposa Grove infestation was collapsing from a virus infection. During the fall, new incipient infestations were also discovered at seven locations in the Sierra-Cascade region, from Shasta County in the north to Fresno County in the south.

Egg mass sampling, conducted during October, indicated a decline to light populations in recent epidemic areas but an increase to light populations in previously incipient infestations. According to this latest information, the overwintering situation is as follows:

Location	Size	Damage	Trend
Burney area, Shasta Co.	Unknown	Spotty	Unknown
Nevada Pt. Ridge, Placer Co.	Large	Severe	Down
Iron Mtn.-Baltic-Plummer Ridges, El Dorado Co.	Very Large	Spotty	Down
Mattley Ridge, Calaveras Co.	Large	Severe	Down
Bailey-Hermit Springs, Calaveras Co.	Medium	Spotty	Increasing
Thunder Hill, Tuolumne Co.	Small	None	Increasing
Strawberry Peak, Tuolumne Co.	Small	None	Static
Mariposa Grove-Raymond Mtn., Mariposa Co.	Medium	Severe	Down
Hume Lake, Fresno Co.	Large	None	Increasing
Horse Thief Creek, Fresno Co.	Small	None	Increasing
Camp Nelson, Tulare Co.	Large	None	Increasing

In a field experiment, the native tussock moth virus was applied by helicopter to two 60-acre plots of the Iron Mtn., Baltic and Plummer Ridges infestations. So far, no effect by this biological treatment can be shown from detailed sampling of treated and untreated areas. Next year additional studies of both chemical and biological control agents may be conducted.

LODGEPOLE PINE NEEDLE MINER, Coleotechnites milleri. The known locations of lodgepole needle miner outbreaks, Virginia Canyon and Conness Creek, within Yosemite National Park, increased by the discovery of another epidemic area in Lyell Canyon. In addition, an area of defoliated lodgepole pine was reported near Waugh Lake in Mono County.

Increasing populations of the needle miner were also surveyed in the important recreation forest at Tuolumne Meadows. The new two-year-life cycle began with the emergence of adult moths in August 1971, followed by mating and egg laying. Eggs of the new generation hatched and the first-stage larvae invaded their first needle in October. A substantially larger population of these new 1971 generation larvae was detected than was found in the corresponding stage of the previous generation. Noticeable defoliation is expected in campgrounds and picnic areas around Tenaya Lake by 1973.

WESTERN PINE TIP MOTH, Rhyacionia bushnelli. The western pine tip moth was discovered for the first time in California on July 27, 1971 at Santee in San Diego County by San Diego County Agriculture Inspector, Vince Cook. California Department of Agriculture surveys have since found infestations in the El Cajon Valley, San Diego County; Chino, San Bernardino County; and as far north as Wasco, Kern County. Fifteen known infested nurseries have been identified in San Diego County. The moth is considered to be too widespread to permit eradication. Introduction is believed to have taken place several years ago on nursery stock from Michigan. This moth, native to the central plains and southwestern United States, is larger than species native to California and considered a much more damaging pest.

BALSAM FIR SAWFLY, Neodiprion abietis. Populations of the balsam fir sawfly again increased in 1971. Most of the increased activity occurred in Plumas, Lassen and Modoc Counties, with the damage reported near Belden and Portola, Plumas County, constituting the most widespread and severe infestation that has occurred for several years. Winter or early spring surveys will attempt to better evaluate these infestations.

OTHER DEFOLIATORS. In a startling display of insect abundance, clouds of the California tortoise-shell butterfly, Nymphalis californica, were reporting during early August from southern Oregon to Highway 120 in Tuolumne County. In the vicinity of Mt. Shasta, the butterflies interfered with freeway traffic by plugging radiators and blocking vision. They were again plentiful in late September. The larvae feed mostly on Ceanothus brush and large populations developed in the extensive brush fields of the region. At least two, and probably three, generations of butterflies were produced during the 1971 season.

Several other defoliators of hardwoods were reported again this year. Those which apparently declined in activity included the fruit-tree leaf roller, Archips argyrospilus, and the fall webworm, Hyphantria cunea. The California oakworm, Phryganidia californica, declined in most areas, but was reported to be damaging around Napa and Lake Berryessa in Napa County. The satin moth, Stilpnotia salicis, increased its activity on cottonwood in the continuing outbreak northeast of Alturas in Modoc County.

SCALE INSECTS. The black pine leaf scale, Nuculaspis californica, has been reported in several local areas, primarily damaging sugar pine. The most severe conditions were found around Mt. Shasta and Dunsmuir in Siskiyou County, where mature sugar pine displayed discolored, shortened, scale-incrusted foliage, which placed the trees under severe stress. At Viola, Shasta County, a decline in scale damage was reported.

A pinyon needle scale, Matsucoccus acalyptus, continues at a high population level on over 22,000 acres in Ventura and Kern Counties. Entomologists at the University of California at Riverside are conducting research on the biology and natural enemies of this pest.

The epidemic of pine needle scale, Phenacaspis pinifoliae, at the popular recreation city of South Lake Tahoe, El Dorado County, has been overcome by the buildup of natural enemies of the scale.

INSECTS DAMAGING PLANTATIONS AND YOUNG TREES. Infestations of the pine resin midge, Cecidomyia piniiopis, have apparently declined in area and intensity although the insect is still quite common throughout California. In specific locations in the Mt. Shasta area, however, the epidemic continues unabated and a few young pine plantations have been permanently damaged.

A native pine shoot moth, Eucosma sonomana, was found retarding height growth of pines in some plantations of the eastside Forests. The discovery follows earlier investigations of the same problem in eastern Oregon. Extensive surveys will be required to evaluate the impact of this insect damage in California.

The fir coneworm, Dioryctria abietella, continues to infest the graft union on valuable seed orchard trees. A field experiment is in progress to compare the effectiveness of a mechanical barrier (Stickem Special) with that of an insecticide (lindane) in preventing this damage.

Damage by Eucosma sonomana is indicated by reduced growth in the terminal shoot and needles. Slicing the affected terminal reveals the feeding tunnel hollowed out by the moth larva.

TABLE I

INSECT CONTROL ACTION RECOMMENDED BY THE COUNCIL - 1971

NORTHERN CALIFORNIA COMMERCIAL AND RECREATIONAL FORESTS

INFESTATION AREA	ESTIMATED ACREAGE	COUNTY	INSECT	HOST	RECOMMENDED ACTION
BARK BEETLES					
McCloud Flats	7,000	Siskiyou	Db	PP	Salvage, thin and research
Silver Creek	100	El Dorado	Dm	LP	Salvage*
Wrights Lake	500	El Dorado	Dm	LP	Salvage*
DEFOLIATORS					
Bailey Ridge	2,000	Calaveras	Hp	WF	Evaluate, surveillance and research
Burney area	500	Shasta	Hp	WF	Evaluate and surveillance
Horse Thief Creek	500	Fresno	Hp	WF	Evaluate and surveillance
Hume Lake	Unknown	Fresno & Tulare	Hp	WF	Evaluate and surveillance
Iron Mtn., Baltic & Plummer Ridges	30,000	El Dorado	Hp	WF	Evaluate, surveillance and research
Mattley Ridge	2,500	Calaveras	Hp	WF	Evaluate and surveillance
Nevada Pt. Ridge	2,000	Placer	Hp	WF	Evaluate and surveillance
Northern California	Unknown	Northern California	Na	WF	Evaluate and surveillance
Northern California	Unknown	Northern California	Cp	PP	Evaluate
Raymond Mtn.	1,000	Mariposa	Hp	WF	Evaluate and surveillance
Sentinel, Crooked and Wet Meadows	2,200	Mono	Cm	LP	Surveillance and research
Strawberry Peak	1,000	Tuolumne	Hp	WF	Evaluate and surveillance
Thunder Hill	2,000	Tuolumne	Hp	WF	Surveillance and research
PLANTATIONS AND EXPERIMENTAL AREAS					
East Side Plantation	Unknown	Northern California	Eu	PP	Surveillance
Established Seed Orchards	100	Northern California	Da,Rz,Zh	PP	Spray grafted trees fives times a year
Plantations		Statewide	Rb	Hard pines	Surveillance and research
Seed Production Areas		Northern California	C&S	PP	Surveillance and research
STATE AND NATIONAL PARKS					
Anza Borrego	500	San Diego	Db,Mc	CP	*
Cuyamaca Rancho State Park	8,000	San Diego	Mc,Db	JP,PP	*
Heart Bar	1,300	San Bernardino	Dj	JP	*
Lassen Volcanic National Park	3,000	Shasta, Lassen	Dj,Db,Dm	JP,PP,SP,LP	Presuppression survey
Palomar State Park	1,500	San Diego	Db,Ips,Sv,Mc	CP,PP,WF	Surveillance
San Jacinto State Park	11,000	Riverside	Mc,Db	JP,CP,PP	*
Sequoia and Kings Canyon	8,500	Fresno	Db,Dm	PP,SP	*
Sequoia and Kings Canyon	400	Tulare	Cm	LP	Surveillance
Yosemite National Park	57,700	Mariposa, Tuolumne	Db,Dm,Dj	PP,SP,JP,LP	*
Yosemite National Park	100,000	Tuolumne	Cm	LP	Surveillance and research
Yosemite National Park	1,000	Mariposa	Hp	WF	Evaluate
SOUTHERN CALIFORNIA RECREATION FORESTS					
Arrowhead-Crestline	47,000	San Bernardino	Dm,Db,Ips,Dj	PP,CP,JP	Sanitation-treatment*
Arroyo-Seco District	3,000	Los Angeles	Db,Ips,Mc	PP,CP,JP	Sanitation-treatment*
Big Bear Valley	8,800	San Bernardino	Dj,Ips,Mc,Sv	JP,WF	Sanitation-treatment*
Corte Madera	1,600	San Diego	Db,Ips,Mc,Dv	CP,JP,PP	Evaluate and salvage
Idyllwild-San Jacinto	37,000	Riverside	Mc,Db,Ips,Dm	PP,CP,JP	Sanitation-treatment*
Julian-Pine Hills	12,000	San Diego	Db,Ips	CP	Evaluate
Laguna Mtn.	9,700	San Diego	Db,Mc	CP,JP	*
Lost Valley	4,000	San Diego	Db,Ips	CP	*
Mt. Baldy District	1,500	Los Angeles	Ips,Dj,Dm,Mc,Db	PP,JP,CP	Sanitation-treatment*
Mt. Pinos-Cuyuma	24,000	Ventura	Ma	Pe	Surveillance--spray high use areas
Mt. Pinos District	7,900	Ventura, Kern	Mc,Ips	JP	Sanitation-treatment*
Palomar Mtn.	6,600	San Diego	Db,Sv	CP,WF	*
Ranger Peak-Figueroa Mtn.	700	Santa Barbara	Db,Ips,Dv	PP,CP	*
San Gorgonio District	25,000	San Bernardino	Db,Dj,Ips	PP,JP,CP	Sanitation-treatment*
Snow Valley	125	San Bernardino	C sp.	JP	Surveillance
Valyermo District	14,600	Los Angeles	Mc,Ips	JP,WF	Sanitation-treatment*
Wrightwood	2,000	San Bernardino	Mc,Ips	JP	*

ABBREVIATIONS USED IN TABLES I AND II

INSECTS

C sp. - Jeffrey pine needle miner
Cm - Lodgepole needle miner
Cp - Pine resin midge
C&S - Cone and seed insects
Da - Fir coneworm
Db - Western pine beetle
Dj - Jeffrey pine beetle
Dm - Mountain pine beetle
Eu - Eucosma
Hp - Douglas-fir tussock moth
Ips - Pine ips
Ma - Matsucoccus sp.
Mc - California flatheaded borer
Na - White-fir sawfly
Rb - Western pine tip moth
Rz - Ponderosa pine tip moth
Sv - Fir engraver
Zh - Needle-sheath miner

HOST

CP - Coulter pine
DF - Douglas-fir
GS - Giant sequoia
IC - Incense cedar
JP - Jeffrey pine
Ju - Juniper
LP - Lodgepole pine
MP - Monterey pine
Pe - Pinyon pine
PP - Ponderosa pine
RF - Red fir
SP - Sugar pine
WF - White fir

* Previous years' recommended action would have been for chemical control or maintenance control (southern California). Based on the Council's 1971 resolution (see Resolution 6, page 19), the Council recommends that chemicals be used only when non-insecticidal alternatives of control are not suitable.

STATUS AND CONTROL OF DISEASES

SIGNIFICANT CONDITIONS

ELYTRODERMA NEEDLE CAST. Elytroderma deformans continued to increase in incidence and severity in the State this year. The disease was especially severe along the south shore of Lake Tahoe from Camp Richardson to Emerald Bay and in the Butte Creek area, Lassen County, of the Lassen National Forest. The death of many pole-size trees in these areas has been attributed to this needle cast. (See the featured article for more information on this disease.)

RED BAND NEEDLE BLIGHT. Scirrhia pini (Dothistroma pini) appears to be relatively inactive on the north coast of California in contrast with recent epidemic years. Only two new centers were found in this area in 1971. The infected bishop and Monterey pines near Fort Dick, Del Norte County, have recovered and there is little evidence of the disease in this Christmas tree plantation.

The fungus continues at endemic levels in most areas having a previous history of the disease. Where S. pini has been active for a number of years, many trees have died or are dying. However, mingled among these trees are vigorous Monterey pines that have been able to maintain enough disease-free crown to continue substantial growth. The last three years' needles on many of these trees are free of the disease, and these trees probably will recover and grow out of the susceptible stage.

BLISTER RUST CONTROL. For the first time in more than 40 years no ribes were eradicated in California. Instead, the search for rust-resistant candidates was intensified and extended to new areas with gratifying results, and preliminary work that will lead to prescriptions for silvicultural control was begun. The direct control project in the southern Sierra Nevada was discontinued when results of scouting indicated that the disease is intensifying too rapidly in this zone to be contained by eradicating infection centers.

PHLOEM NECROSIS OF DOUGLAS-FIR. Dermea pseudotsugae, a fungus that causes stem and twig cankers on Douglas-fir was first discovered in California in 1970. The original discovery was in a Douglas-fir plantation near Happy Camp in Siskiyou County. In 1971, it was found throughout Humboldt, Trinity, Siskiyou, and northwestern Mendocino Counties. Little is known about the behavior of the disease and the magnitude of its threat to plantations and natural stands. The fungus appears first to infect single branches; it then grows into the main stem, killing the phloem tissues and forms cankers. Young trees often are killed by the fungus.

NURSERY DISEASES. Two fungi caused significant losses at the Humboldt Nursery. These were Sirococcus strobilnus and Phoma sp. Sirococcus strobilnus caused a tip blight on 1-0 Jeffrey and ponderosa pine, killing many seedlings. Phoma sp. attacked the foliage of 1-0 Douglas-fir during the dormant season, causing severe defoliation of the seedlings, usually resulting in death. Approximately two million seedlings were killed by this fungus in 1971.

Cooperative chemical control studies were carried out during 1970 and 1971 by the University of California Agricultural Extension Service, Pacific Southwest Forest and Range Experiment Station, and Region 5, Branch of Pest Control. Application of Daconil 2787 (75% chlorothalonil) at 2 lbs./100 gallons, and Difolatan (39% captafol) at 1 qt./100 gallons, resulted in an excellent control of these fungi.

OTHER DISEASES. Several minor leaf, needle, and canker diseases were prevalent this year, presumably because of the unusually wet, cool, spring conditions. These diseases are not expected to persist. Several other diseases appear to be more damaging and are under observation.

SURVEYS

SMOG DAMAGE SURVEY. The survey of smog damage on coniferous timber was continued this year on the San Bernardino National Forest. Additional aerial photography and ground checking will be conducted in the spring of 1972.

ROOT DISEASE SURVEY. Forest Service and University of California pathologists are cooperating in studies to develop techniques for evaluating root disease impact. Aerial photographs of high-incidence root disease areas on the Eldorado and Tahoe National Forests were taken in June. These photos are being interpreted and ground checked to determine if there are distinct photo characteristics (photo signatures) that could be used to identify groups of trees affected by root diseases.

LASSEN NATIONAL FOREST FOMES ANNOSUS SURVEY. A preliminary survey of 75 Fomes annosus infection centers was made in October to test hypotheses regarding local spread of the disease, and to determine factors affecting impact estimations. Pathologists from the Forest Service and University of California, as well as foresters from the Lassen and Plumas National Forests cooperated on the survey.

YOSEMITE VALLEY FOMES ANNOSUS SURVEY. A survey to determine the extent of Fomes annosus revealed about 85 infection centers ranging in size from a few trees to several acres of trees. Survey maps and data will be used in evaluating the importance of this root disease as causing trees to become hazardous and a

threat to the forest cover in the developed portions of the Valley. The University of California, the National Park Service, and the Forest Service are cooperating in this project.

WHITE PINE BLISTER RUST SURVEY. Work continued on the white pine blister rust surveys, with emphasis on the nature of infection in individual infected trees. Earlier surveys provided information on the distribution and intensity of the disease in the northern Sierra Nevada. In combination, results from all surveys will be used to forecast rust behavior in presently infected young-growth stands, and to formulate management recommendations for them.

RED FIR DWARF MISTLETOE SURVEY. A preliminary survey to determine the impact of dwarf mistletoe (Arceuthobium abietinum f. sp. magnificae), in red fir forests of California was carried out by the Forest Service on the Lassen, Tahoe, Stanislaus, and Sierra National Forests. Early results suggest that young-growth stands respond to release even though they were infested with dwarf mistletoe for many years prior to release.

NEW DISEASES AND HOSTS

Red fir dwarf mistletoe (Arceuthobium abietinum f. sp. magnificae) was reported on subalpine fir (Abies lasiocarpa) growing in the Marble Mountains Wilderness Area near Little Duck Lake, Siskiyou County. Subalpine fir is the only known host attacked by both forms of true fir dwarf mistletoe.

Bifusella saccata was reported on whitebark pine (Pinus albicaulis) in the Sequoia National Park near Walus Creek, and in Kings Canyon National Park near Sixty Lakes Basin and Palisade Lakes. This fungus causes a needle cast on whitebark pine.

NEW SCIENTIFIC NAMES OF DWARF MISTLETOE

Frank G. Hawksworth, Forest Service pathologist in the Rocky Mountain Forest and Range Experiment Station, has prepared a monograph of dwarf mistletoes of the World, which will soon be published. There are a number of name revisions in this publication. The California species of dwarf mistletoes are listed by host in Table III. For example, dwarf mistletoe on white fir is now known as Arceuthobium abietinum f. sp. concoloris. It was formerly called A. campylopodium f. abietinum.

The species A. abietinum is the only one in California that has a forma species; f. sp. concoloris for white fir and f. sp. magnificae for red fir.

TABLE II

FOREST DISEASES REPORTED - 1971

CAUSAL AGENT	HOST	COUNTY
RUSTS		
Cronartium ribicola	SP	El Dorado
	SP	Lassen
	SP	Siskiyou (2)*
	SP	Tehama
	SP	Tulare
Melampsorella caryophyllacearum	WF	Tulare
Peridermium harknessii	MP	Humboldt
FOLIAGE DISEASES		
Bifusella linearis	WP	Fresno
	LiP	Inyo
Bifusella saccata	WP	Fresno (2)*
	WP	Tulare
Davisomycella medusa	PP	Siskiyou
	PP	Trinity
Davisomycella montana	LP	Fresno (4)*
Elytroderma deformans	JP	El Dorado
	PP	El Dorado
	PP	Siskiyou
	PP	Trinity
	PP	Tuolumne
Gleosporium quercinum	Oak	Lake
Herpotrichia nigra	RF	Humboldt
	WF	Siskiyou
Lirula abietis-concoloris	WF	Plumas
	WF	Siskiyou
	WF	Trinity
Lophodermium decipiens	PP	Shasta
	ScP	Shasta
Lophodermium nitens	MP	Humboldt
Lophodermium piceae	SS	Del Norte
Marssonina populi	QA	Fresno
Naemacycleus niveus	MP	Del Norte
Phyllactinia corylea	LO	San Diego
Rhabdocline pseudotsugae	DF	Plumas
Scirrhia acicola	LP	Shasta
	PP	Shasta
Scirrhia (Dothistroma) pini	BP	Del Norte
	MP	Del Norte
Stegopezizella balsameae	WF	Lassen
	WF	Modoc
Venturia populina	CW	Modoc
	QA	Tuolumne
Venturia tremulae	QA	Madera
	QA	Mono
MISTLETOES		
Dwarf Mistletoe	WF	Amador
	DP	Kern
	PP	Los Angeles
	SP	Los Angeles
	CP	Monterey
	SP	Plumas
	Pe	San Bernardino
	Pe	Santa Barbara
	RF	Siskiyou
	WF	Trinity
True Mistletoe	IC	El Dorado
	Ju	El Dorado
	WF	El Dorado
	WF	Los Angeles
HEART ROTS		
Echinodontium tinctorium	WF	San Bernardino
Fomes pini	DF	Siskiyou (3)*
ROOT DISEASES		
Armillaria mellea	CBO	El Dorado
	Oak	El Dorado (2)*
	PP	El Dorado
	WF	El Dorado
	RF	Madera

CAUSAL AGENT	HOST	COUNTY
ROOT DISEASES		
Armillaria mellea (cont'd)	DF	Mendocino
	GS	San Berardino
	--	San Bernardino
	WF	San Diego
	PP	Shasta
	Oak	Siskiyou (4)*
	DF	Siskiyou (2)*
Fomes annosus	WF	El Dorado
	PP	Lassen
	PP	Mariposa
	Ju	Modoc
	JP	San Berardino
	WF	Sierra
	WF	Siskiyou
	SP	Siskiyou
	WA	Tuolumne
	PP	Tuolumne (4)*
Ganaderma spp.	PT	Orange
Verticicladiella wagenerii	PP	Shasta
NURSERY DISEASES		
Nutrient Deficiency	BP	Humboldt
	MP	Humboldt
Phoma sp.	DF	Humboldt
Rosselinia herpotrichoides	DF	Humboldt (2)*
Sirococcus strobilinus	JP	Humboldt
	PP	Humboldt
Unknown (may be Botrytis)	DF	Humboldt
CANKER & STEM DISEASES		
Ascochyta piniperda	CP	Mariposa
Botrysphaeria sp.	Ce	Humboldt
	DF	Humboldt
	HW	Humboldt
Unknown Canker & Dieback	WF	El Dorado
	SP	El Dorado
	MC	Humboldt (2)*
	MP	Humboldt
	DP	Madera
	Mz	Madera
	MP-KP Cross	Mendocino
	WF	Nevada
	JP	Plumas
	WF	Siskiyou
Cytospora abietis	RF	Shasta
	WF	Siskiyou
	WF	Trinity
Dermea pseudotsugae	DF	Humboldt (8)*
	DF	Siskiyou (4)*
	DF	Mendocino
	DF	Trinity
MISCELLANEOUS		
Salt or Weather	DF	Humboldt
Drought	Many	Plumas

HOST ABBREVIATIONS

Major Conifer Hosts: Refer to Table I.

Other Hosts:

BP - Bishop pine	MC - Monterey cypress
Ce - Ceanothus	Mz - Manzanita
CBO - California black oak	PT - Pepper tree
CW - Cottonwood	QA - Quaking aspen
HW - Hardwood	SS - Sitka spruce
KP - Knobcone pine	ScP - Scotch pine
LiP - Limber pine	To - Toyon
LO - Live oak	WA - White alder

* Number of reports received.

TABLE III

DWARF MISTLETOES OF CALIFORNIA AND ASSOCIATED HOSTS

Dwarf Mistletoe Scientific Name Arceuthobium	Principal Host	Secondary Host	Occasional Host	Rare Host	Immune
A. abietinum f. sp. concoloris (A. campylopodum f. abietinum)	Abies concolor Abies grandis	Picae breweriana Abies amabilis	Abies lasiocarpa	Pinus lambertiana Pinus murrayana Pinus monticola	Abies magnifica Picea engelmanni Picae pungens Pinus muricata Pinus ponderosa Pinus scopulorum Pinus washoensis Pinus monophylla Pinus flexilis Pseudotsuga menziesii Tsuga heterophylla
A. abietinum f. sp. magnificae (A. campylopodum f. abietinum)	Abies procera Abies magnifica				Abies concolor Abies grandis Tsuga mertensiani
A. americanum (A. americanum)	Pinus latifolia Pinus murrayana Pinus banksiana	Pinus scopulorum Pinus contorta ?	Pinus albicaulis Pinus aristata Pinus flexilis Pinus ponderosa	Pinus attenuata Picea glauca Picea engelmannii Pseudotsuga menziesii Picea pungens	Abies grandis Abies lasiocarpa Abies magnifica Lariz occidentalis Tsuga mertensiana
A. californicum (A. campylopodum f. blumeri)	Pinus lambertiana	Pinus monticola	Picea breweriana		Abies concolor Pinus attenuata Pinus coulteri Pinus ponderosa
A. campylopodum (A. campylopodum typicum)	Pinus ponderosa Pinus jeffreyi Pinus attenuata	Pinus coulteri Pinus scopulorum	Pinus latifolia Pinus murrayana Pinus contorta	Pinus lambertiana	Abies concolor Abies grandis Pinus monticola Pinus monophylla Pinus quadrifolia Pinus sabiniana Pseudotsuga menziesii
A. cyanocarpum (A. campylopodum cyanocarpum)	Pinus flexilis Pinus aristata	Pinus albicaulis	Pinus monticola	Pinus scopulorum Pinus latifolia Picea engelmanni Pinus balfouriana	Abies lasiocarpa Pinus lambertiana Pinus strobiformis Pseudotsuga menziesii
A. divaricatum (A. campylopodum divaricatum)	Pinus edulis Pinus cembroides Pinus monophylla Pinus quadrifolia				Pinus jeffreyi Pinus scopulorum Pseudotsuga menziesii
A. douglasii (A. douglasii)	Pseudotsuga menziesii	Abies arizonica	Abies grandis	Abies concolor Abies lasiocarpa Picea pungens Pinus flexilis	Abies magnifica Abies vejarii Larix occidentalis Pinus edulis Pinus ponderosa Pinus scopulorum Pinus strobiformis
A. occidentale (A. campylopodum f. tsugensis)	Pinus sabiniana Pinus radiata Pinus muricata	Pinus attenuata	Pinus bolanderi Pinus coulteri		Abies grandis Pinus ponderosa Pseudotsuga menziesii Tsuga heterophylla
A. tsugensis (A. campylopodum f. tsugensis)	Tsuga heterophylla Tsuga mertensiana	Abies lasiocarpa Abies procera Abies amabilis Pinus albicaulis Pinus contorta	Abies grandis Picea breweriana	Picea sitchensis	Abies magnifica Larix occidentalis Pinus murrayana Pinus jeffreyi Pseudotsuga menziesii

Susceptibility of hosts of North American dwarf mistletoes based on natural infection of native trees. A question mark indicates that observations have been insufficient to determine the appropriate susceptibility class or that the reported host-parasite combination has not been confirmed. The dwarf mistletoe name shown in parenthesis is the former scientific name.

ELYTRODERMA NEEDLE DISEASE OF PINES

Elytroderma needle disease of pines caused by the fungus Elytroderma deformans is a widespread and serious tree disease in Western North America. In California, ponderosa and Jeffrey pines are most commonly attacked, but lodgepole and knobcone pines occasionally are infected.

Although the disease is widely distributed throughout the State, it is limited in occurrence and intensity by local environmental conditions. Cool, moist drainages or areas around lakes and streams, appear to provide conditions necessary for buildup and damage from this disease. For example, severe outbreaks have occurred around Manzanita Lake in Lassen National Park; Lake Almanor, and along the south shore of Lake Tahoe.

Although areas of severe outbreak are widely separated, where they do occur, the disease presents a serious problem to forest managers and homeowners. Areas along lake shores and near streams are generally of high recreational use and prime sites for summer home development.

Losses from Elytroderma result from both mortality and decreased tree vigor. Trees not killed often are weakened and predisposed to attack by bark beetles. Studies in Oregon show that the probably consequence of the disease on ponderosa pines is as follows: (1) If needles are diseased on more than three-fourths of the twigs, the tree is likely to die soon as a direct result of infection; (2) if needles are diseased on one-fourth to three-fourths of the twigs, the tree is weakened and likely to be killed by bark beetles or other parasites; (3) if diseased needles occur on less than one-fourth of the twigs, little or no injury will occur. Thus, Elytroderma has the potential to cause heavy losses when severe buildup occurs, especially after two or three consecutive years.

Elytroderma deformans is a unique needle cast fungus in that it not only infects needles but may also invade host branches and establish a perennial systemic infection. As a result, each year the newly developing needles are infected by the fungus in infected branches. Brooms somewhat like those formed by dwarf mistletoe on pines are also produced by trees infected with Elytroderma. Brooms tend to be fairly dense, globose, and consist of numerous upturned branch tips.

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*Each year a different California forest disease will be described in enough detail so that field-going personnel can more readily recognize it.

The most readily recognized symptom of the disease is the reddening of infected needles in the late spring and early summer. As summer progresses, the reddish color disappears and only dead, brown needles remain. The fruiting bodies of the fungus start to develop on the needles at about the time the reddish symptoms begin to disappear. Mature fruting bodies appear as elongate, dull, black streaks on the needle surfaces oriented parallel to the long axis of the needle.

Branches systemically infected by the fungus show a brown flecking of the inner bark tissues. Cutting open the bark tissue and examining it for brown flecking is a good method of diagnosing the presence of this disease when other symptoms are not conspicuous.

The infection cycle of this disease is not precisely known. It is known that infection does not occur every year, but more typically only during the occasional year when environmental conditions favor infection. The fruiting bodies mature, spores are cast, and presumably infection occurs in the fall, probably during periods when early fall rains occur.

On the other hand, it is believed that some fruiting bodies overwinter, cast spores and infect only the young, succulent new needles produced in the spring. Studies are underway to answer some of the questions concerning the infection and buildup of this disease in California.

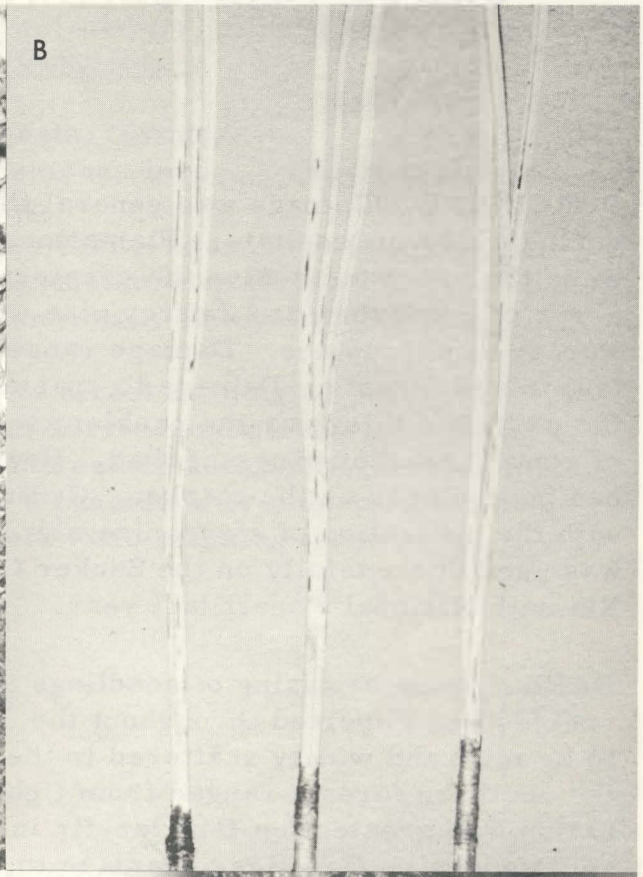
Following infection, the fungus grows through and eventually kills the needle. In some instances, the organism grows into the branch causing a systemic infection. But not all branches become systemically infected. Needles that are infected turn red in color, then brown, and finally are "cast" from the tree in the winter.

Control. --No control is available that will eradicate or completely protect trees from infection by Elytroderma. However, damage can be minimized by maintaining trees in a thrifty condition. The following action can be taken:

1. Maintain good spacing. Damage is most severe in crowded, slow-growing trees.

2. Remove or select against heavily infected trees or trees infected within 3- to 6-feet of the top. Small trees infected in the top become severely stunted or die.

3. Prune individual infected trees. Pruning will prevent spread into the trunk, reduce the source of spores for further infection, and likely also increase tree vigor. Brooms should be removed and if infection is light elsewhere in the crown, particularly the lower crown, prune out the infected branches.



ELYTRODERMA DEFORMANS

A. Mortality of ponderosa pine resulting from severe Elytroderma deformans infection.

B. The long, slender, dark strutures on the ponderosa pine needles are fruiting structures of Elytroderma deformans.

C. The dark necrotic lesions in the inner bark of 2- to-12-year-old branch segments are characteristic of systemic infection.

STATUS AND CONTROL OF ANIMAL PESTS

PORCUPINE. Damage was general throughout all the major timber producing areas of the State. Plantations of the inland northern forests were the areas to receive the greatest amount of damage. Nine thousand acres of ponderosa and Jeffrey pine were damaged on the Klamath National Forest by porcupines. Damage ranged from light to moderate on the central inland forests. Damage to coastal forests has been insignificant in the past, but this year the problem seems to be increasing. New methods of control are being researched. However, at the present time nothing has been placed on the market. Control has been achieved in some areas with the utilization of strychnine salt blocks and hunting. This method was used successfully on the Sucker Creek and Dock Well areas of the Klamath National Forest last year.

DEER. Some browsing of seedlings and saplings of most coniferous species was reported throughout the State. Deer browsing was reported to be mild and widely scattered in the southern Forests. Damage in the northern forests ranged from light to heavy. As usual, deer depredation was greatest on Douglas-fir in Humboldt, Del Norte, Siskiyou, and Mendocino Counties. Damage to plantations on the Six Rivers National Forest totaled 8,000 acres and is increasing. To date, available control methods have not met with a great deal of success. A polyethylene mesh tubing was used for the first time this year with some success in an attempt to protect heavily browsed leaders. However, at times it binds and restricts growth when used on young seedlings. Current research efforts are being directed towards a repellent with a fish base, which has had some success on an experimental basis.

POCKET GOPHER. Damage ranging from static to increasing was reported Statewide with the exception of the northern coastal areas. Serious damage was inflicted upon ponderosa pine, Jeffrey pine, white fir and red fir. Again, the most serious damage occurred in Siskiyou and Modoc Counties. However, increasing damage to plantations and natural stands on the Eldorado National Forest is a matter of future concern. Continual use of the Forest-land Burrow Builder has rendered the damage static in those areas that are treated on an annual basis. In these areas where control with the machine is not feasible, damage seems to be increasing. Control efforts in the future will be enhanced with the use of Gophicide which is now registered in California.

MINOR SPECIES. The following list of species caused minor damage in the counties noted. Although treated here as minor, the damage was severe and heavy in some areas, but it was more localized and not widely scattered.

Species	Counties
1. Black Bear	Shasta, Trinity
2. Domestic Stock	Siskiyou, Inyo
3. Elk	Inyo
4. Ground Squirrels	Humboldt, Lassen, Shasta
5. Meadow Mouse	Mendocino, San Bernardino
6. Woodrat	Mendocino, Humboldt, Shasta

DIRECT SEEDING. Some 1,029 acres of direct seeding was done by the Bureau of Land Management, Forest Service and private companies. With the limited or restrictive use of both endrin and 1080, greater emphasis has been placed on the use of diphacinone or chlorophacinone for control of seed-eating rodents. Field tests utilizing these anti-coagulants have had good results.

The POCKET GOPHER - a plantation menace!

The pocket gopher (Thomomys spp.), of which there are at least five species in California, is one of the major animal forest pests. They are distributed throughout most areas in the State.

Pocket gophers damage coniferous trees as they feed on the roots, stems and branches of seedlings and saplings, usually killing the tree. Root gnawing occurs year round and sometimes goes unnoticed until the young trees begin to lean or fade. Stem and branch gnawing occurs basically during the winter months in areas where snow cover occurs and may go as high as the snow depth. It is usually observed the following spring or summer as the completely girdled tree fades or as the remaining stub is noticed. The damage can be identified by the severe gnawing of the wood as contrasted to bark peeling normally done by a porcupine. When roots, stems and branches are gnawed off, they show a 45^{o} angle cut with prominent tooth marks. Supplemental signs include fan-shaped mounds of dirt in the area, solid cores of earth of varying lengths on the surface of the ground, and some openings to underground runways. The earth cores break down rapidly, depending on soil types and are not so evident later in the summer. In the higher mountainous areas, gopher activity may be slow during spring months and earth mounds will be few in number.

Pocket gophers receive their name from the two external fur-lined cheek pouches on their face. They do not hibernate but are active year round. They spend very little time on the surface of the ground or snow, but are continuously burrowing underneath in search of food, which consists of roots and bulbs during most seasons of the year. They do feed on the bark, wood and needles of conifers during winter months as they burrow through the snow. The earth mounds are formed as they push out the excess dirt from their digging activities. The earth cores are formed when they push this same excess dirt into burrows in the snow which eventually melts leaving the earth core on the ground surface.

They are antagonistic, even to their own kind, except during the breeding season and when the young are being reared. In the lower valleys breeding occurs during the spring and at higher elevations it occurs during the early summer. Most pocket gophers involved with conifer damage breed only once a year although some breed more often. Following a short gestation period of 18 to 19 days, an average of 6 young are born. They remain in the nest for several weeks, but by fall they move out of the parental tunnels, sometimes over land for considerable distance, and establish their own tunnel system.

RESOLUTIONS ADOPTED BY
THE CALIFORNIA PEST CONTROL ACTION COUNCIL
AT ITS ANNUAL MEETING, NOVEMBER 1971

1. Recommended that virus and population studies receive continued support and that support for chemical control and microbial control of the Douglas-fir tussock moth be initiated. (Resolution brief.)

2. Recommended that an attempt be made to report actual net acreage of infested trees rather than gross acreage. (Resolution brief.)

3. Recommended that research on the distribution, impact, rate of spread and biological control of Rhyancionia bushnelli be initiated, and that the Director of the California Department of Agriculture be asked to alert the inspection personnel about this pest, and that the county agricultural pest inspectors be provided adequate training in forest pest detection. (Resolution brief.)

4. Recommended that a measurement of population dynamics be included, if possible, as one of the criteria for evaluation of insect control projects. (Resolution brief.)

5. COUNCIL MEMBERSHIP. In order to facilitate the operation of the Council, and to overcome present problems in maintaining committee and membership lists, it is resolved that the following features be incorporated into the Council charter.

   a. The Council shall maintain a membership roster.

   b. The roster shall be maintained by a membership committee chaired by the secretary of the Council.

   c. The membership committee shall: update the roster annually, and shall ensure that Council members meet the qualifications specified in the charter objectives, with the understanding that graduate students in appropriate disciplines shall qualify.

   d. Names shall be automatically maintained on the roster as long as individuals remain active in Council affairs.

   e. Each member of the Council shall specify a subject matter committee preference and be considered a voting member of the committee specified.

   f. The chairman and secretary of the subject-matter committees shall be elected annually by the committee membership and shall be members of the executive committee.

g. Individuals not on the roster must apply for membership at least 60 days prior to a meeting of the Council in order to vote at that meeting.

h. Three members of the executive committee shall be elected at large during the annual meeting.

6. USE OF LINDANE. Whereas members of the Council gathered information on the properties and characteristics of lindane; and

Whereas this information was circulated to the members for their individual deliberation; and

Whereas the members met for collective deliberation of this information; and

Whereas the majority of the Council agreed that lindane is effective in reducing bark beetle populations, at least over the short-term run, and does not appear to accrue in harmful amounts in food chains or in abiotic segments of the environment; is one of many alternatives in the suppression and prevention of bark beetle attacks; has been used sparingly in the forests, always with narrowly defined targets; is probably most useful in high-use forestry and with high-value forest trees; is also an effective treatment for borers, powder-post beetles, ambrosia beetles, and both drywood and subterranean termites; and can be accommodated by the concept of integrated control: Now therefore, the Council

Recommends that lindane be retained as a registered insecticide for the noted insects; and

Recommends that it be used only when noninsecticide alternatives of of control are not suitable; and further

Recommends that a time limit of use be seriously considered to encourage the development of a substitute material or method which has fewer maleffects upon the insectan natural enemies of the above pests and less potential for environmental contamination.

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